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COMPARATIVE EFFICACY OF TWO IMMUNOCONTRACEPTIVE VACCINES FOR CONTROLLING REPRODUCTION IN WILD NORWAY RATS

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Abstract: We assessed the potential of two methods of rat immunocontraception by comparing immune, hormonal, and natality responses of wild Norway rats (*Rattus norvegicus*) to two immunocontraceptive vaccines. One method involved synthetic mouse zona pellucida (ZP) made antigenic by coupling it to keyhole limpet hemocyanin (KLH), a high molecular weight immunogenic protein. The second method involved use of gonadotrophin releasing hormone (GnRH) made immunogenic by coupling it to KLH.

Ninety rats were used, 40 of which were untreated males and females used to breed treated rats in breeding trials. Fifty vaccine treated rats were subcutaneously injected with 3-100 mcg doses (prime and 2 boosters) of each vaccine (10 male and 10 female sham controls, 10 ZP females, 10 GnRH males, and 10 GnRH females). Breeding trials were conducted and ELISA antibody titers were measured to monitor vaccine efficacy. Control rats demonstrated 80% breeding success, with litter sizes of 4-8 pups. Both vaccines caused significant immune responses. ZP immunized females demonstrated a reduction in progesterone following vaccination. However, GnRH was markedly more effective than ZP vaccine (100% sterility of both sexes vs 50% sterility of females). Male GnRH rats were monitored for 12 months to determine the length of antibody induced infertility. Testosterone was non-detectable and the testicles were approximately 90% atrophied up to 11 months after vaccination. There were no significant differences in mortality or body weight change between treatment groups throughout the study. Also, with the exception of male scrotum regression, there was no change in general appearance. GnRH appears to have excellent potential as an immunocontraceptive agent for various wildlife species. In some rodent species (e.g., wild rats), it could provide sterility throughout a typical life span.